Accommodations Toolkit

Screen Reader: Research

This screen reader fact sheet is part of the *Accommodations Toolkit* published by the National Center on Educational Outcomes (NCEO). It summarizes information and research findings using a screen reader as an accommodation. This toolkit also summarizes states' accessibility policies for the screen reader (/nceo/accommodations-toolkit/screen-reader-policies).

What is the screen reader accommodation?

Screen reader is an assistive technology software tool to support students in reading content displayed on a computer screen (Johnstone et al., 2009). It is sometimes more broadly referred to as a read-aloud or text-to-speech software that converts print to speech with a synthesized voice or uses a human reader (Buzick et al., 2014). However, a screen reader may include features designed specifically for users who are visually impaired, which convert print to braille (Hansen et al., 2016; Johnstone et al., 2009).

What are the research findings on who should use this accommodation?

The screen reader accommodation has benefited students with visual impairments or blindness that prevents them from seeing and navigating screen content (Buzick et al., 2014; Hansen et al., 2016; Johnstone et al., 2009), and may be helpful for students with reading-based learning disabilities (Buzick et al., 2014). Students in K-12 may benefit from using a screen reader (Buzick et al., 2014; Hansen et al., 2016; Johnstone et al., 2009) to enable them to participate in the same assessments as students without disabilities.

What are the research findings on the implementation of screen reader use? Two studies were located on the implementation of screen readers in assessments.

One study summarized previous research examining the effects of read-aloud in various formats, including screen reader (Buzick et al., 2014). The authors compared the performance of K-12 students with and without disabilities using the accommodation for reading and mathematics assessments. Results indicated a greater effect for reading than math for both student groups, though the effect was more significant for students with disabilities.

The second study was of secondary students with a visual impairment who had average or higher reading skills. It compared students' feedback on the use of screen reader, game-controller-based haptics, tablet-based vibrotactile haptics, and tactile graphics on a science assessment task (Hansen et al., 2016). The authors found that students with visual impairments could use all four supports in the task with some success. Mostly, they could understand synthesized speech and navigate independently through most of the task using a screen reader tool with almost no help. However, some usability challenges in manually manipulating parts of the task required greater support for students to make the assessment more accessible and usable.

What perceptions do students and teachers have about the use of screen reader? One study examined student perceptions on the use of screen reader as an assessment accommodation. Hansen et al. (2016) examined the perceptions of secondary students with a visual impairment regarding using four different types of visual supports, including screen readers. Students found the synthesized voice of the screen reader understandable but experienced some challenges navigating through aspects of a science assessment task, and perceived that they required more support.

Another study examined teachers of students with visual impairments' perceptions of different types of assistive technology (AT), including screen readers. Johnstone et al. (2019) surveyed teachers of students with visual impairments at the secondary level. It was conducted to determine the extent and types of AT used in reading instruction and assessment. Results indicated that the students used an array of AT accommodations that played a significant role in reading instruction and that teaching students how to use AT independently to access content was beneficial. Students used the screen reader more than other magnification accommodations options. Specifically, students used the screen reader option for 26% of the items, and none of the magnification options was used for more than 13% of the items. The study found that the range of approaches used for students with visual impairments indicates a need to understand how the various screen reader technologies used in reading instruction can appropriately be applied to large-scale assessments.

What have we learned overall?

Studies about screen readers and their use in assessments are scarce. Additional research on the screen reader accommodation is needed at all grade levels, but there is especially a dearth of research at the elementary level. The existing studies focused primarily on secondary students with visual impairments. Screen reader is a type of AT regularly used by teachers of students with visual impairments in reading instruction. Teachers also instruct secondary students on how to use AT to access reading content independently. However, there was only one study that examined the effect of the screen reader accommodation on student performance, so additional research is especially needed in that area. Research is also needed on how to improve the accessibility of screen readers. For example, research is needed on how to use screen readers with science assessment tasks that have hands-on components. Further research is also needed on how to improve teacher and student familiarity with screen readers, the consideration of screen readers during the design of assessment tasks, and the application of a screen reader for different content assessments (e.g., reading, math, science). Additionally, research is needed that examines the possible benefits of the screen reader accommodation for students who have disabilities other than visual impairments (e.g., disabilities that affect how the student interacts with print).

Footnotes

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Research on screen reader summarized here is also available in NCEO's searchable *Accommodations for Students with Disabilities Bibliography* (https://nceo.info/Resources/bibliographies/accommodations/bibliography (https://nceo.info/Resources/bibliographies/accommodations/bibliography)) and in NCEO syntheses of research summaries for: 1999-2001 (https://nceo.umn.edu/docs/OnlinePubs/TechReport34.pdf), 2002-2004 (https://nceo.umn.edu/docs/OnlinePubs/Tech45/Technical45.pdf), 2005-2006 (https://nceo.umn.edu/docs/OnlinePubs/Tech47/TechReport47.pdf), 2007-2008 (https://nceo.umn.edu/docs/OnlinePubs/Tech56/TechnicalReport56.pdf), 2009-2010 (https://nceo.umn.edu/docs/OnlinePubs/Tech65/TechnicalReport65.pdf), 2011-2012 (https://nceo.umn.edu/docs/OnlinePubs/Synthesis94/Synthesis94.pdf), 2013-2014 (https://nceo.umn.edu/docs/OnlinePubs/Report402/NCEOReport402.pdf), 2015-2016 (https://nceo.umn.edu/docs/OnlinePubs/NCEOReport412.pdf), 2017 (https://nceo.umn.edu/docs/OnlinePubs/NCEOReport418.pdf), 2018 (https://nceo.umn.edu/docs/OnlinePubs/NCEOReport423.pdf), 2019 (https://nceo.umn.edu/docs/OnlinePubs/NCEOReport433.pdf), 2020 (https://nceo.umn.edu/docs/OnlinePubs/NCEOReport436.pdf), 2021 (https://nceo.umn.edu/docs/OnlinePubs/NCEOReport438.pdf). See the reports and online bibliography for additional information about the criteria used to identify studies included in this fact sheet.

References

Buzick, H., & Stone, E. (2014). A meta-analysis of research on the read aloud accommodation. *Educational Measurement: Issues and Practice*, *33*(3), 17–30. https://doi.org/10.1111/emip.12040 (https://doi.org/10.1111/emip.12040)

Hansen, E. G., Liu, L., Rogat, A., & Hakkinen, M. T. (2016). Designing innovative science assessments that are accessible for students who are blind. *Journal of Blindness Innovation and Research*, *6*(1). https://doi.org/10.5241/6-91 (https://doi.org/10.5241/6-91)

Johnstone, C., Thurlow, M., Altman, J., Timmons, J., & Kato, K. (2009). Assistive technology approaches for large-scale assessment: Perceptions of teachers of students with visual impairments. *Exceptionality*, *17*(2), 66–75. https://doi.org/10.1080/09362830902805756 (https://doi.org/10.1080/09362830902805756)

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